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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,916	08/18/2003	Olov B. Karlsson	G0603	3880

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EXAMINER	
SCHILLINGER, LAURA M	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

CT

Office Action Summary	Application No.	Applicant(s)	
	10/642,916	KARLSSON ET AL.	
	Examiner	Art Unit	
	Laura M. Schillinger	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al ('866).

Park et al teaches the following claimed limitations as cited below:

21. (New) A method of enhancing carrier mobility in a semiconductor active region of a semiconductor device, comprising:

providing a layer of semiconductor material (Fig.5A (40));

providing a trench isolation region in the layer of semiconductor region that defines placement of the active region, the trench isolation region defined by sidewalls and a bottom (Fig.5B (47)) and includes:

a liner made from a material having a relative permittivity (K) of 9, the liner conforming to the sidewalls and bottom (Fig.5C (50- SiN)); and

a fill section made from isolating material that is disposed within and conforms to the liner (Fig.5D (52)); and

exerting a compressive or tensile stress on the active region with the liner (Col.7, lines: 55-65) teach that the compressive or tensile stress results in an enhanced carrier mobility in the active area (Col.8, lines: 55-65- inverse narrow width effect is reduced).

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include silicon nitride as a liner with a relative permittivity of about 10, because silicon nitride has a relative permittivity of 9 which to one of ordinary skill in the art is "about 10" as Applicant has claimed.

22. (New) The method according to claim 21 , further comprising forming the semiconductor device using an active region and wherein the liner has a compressive stress to compress the active region, the compressive stress effective to enhance electron mobility within the active region (Col.7, lines: 55-65).

23. (New) The method according to claim 22, wherein the semiconductor device is an NMOS device (Col.2, lines: 35-40).

24. (New) The method according to claim 21 , further comprising forming the semiconductor device using an active region and wherein the liner has a tensile stress to strain the active region, the tensile stress effective to enhance hole mobility within the active region (Col..7, lines: 15-30).

25. (New) The method according to claim 24, wherein the semiconductor device is a PMOS device (Col.2, lines:35-40).

26. (New) The method according to claim 21 , wherein the fill section is composed of one or more materials selected from silicon oxide, silicon nitride, polysilicon and mixtures thereof (Col.6, lines: 15-25)).

27. (New) The method according to claim 26, wherein the fill section is deposited using chemical vapor deposition (CVD) (Col.6, lines: 15-25).

28. (New) The method according to claim 21, wherein the layer of semiconductor material is a semiconductor film disposed on an insulating layer, the insulting layer being disposed on a semiconductor substrate (Fig.5A (42))).

29. (New) The method according to claim 28, wherein the bottom of the trench is defined by the insulating layer (Fig.5C (50)).

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Park ('866) as applied to claims above, and further in view of Gardner.

30. (New) The method according to claim 21 , Park teaches to use SiN as a trench liner however fails to teach wherein the liner has a relative permittivity (K) of about 20 or more.

However, Gardner teaches implementing a trench liner with a high-K dielectric (Col.4, lines: 60-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Park to include a high-K trench liner as taught by Gardner because it provides for shallower junctions and provides a deeper implant into subsequent polysilicon structures (See Gardner Col.4, lines: 60-65).

Response to Arguments

Applicant's arguments filed 11/26/04 have been fully considered but they are not persuasive. Applicant argues that silicon nitride does not anticipate the claim language which recites that the dielectric has a permittivity of about 10. As addressed by the Examiner's revised rejection, silicon nitride's permittivity of 9 anticipates the "about" 10 as claimed by the Applicant. Furthermore, Applicant argues that the silicon nitride layer does not enhance the carrier mobility of the active region, this is also not persuasive since as taught by Park in Col.8, lines: 55-60, the liner reduces the inverse narrow width effect which is inversely proportionate to the carrier mobility of the active layer. Therefore, Applicant's arguments are not deemed persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LMS

11/10/04